

## Fire Resistance of Concrete Homes

*Of all construction materials, concrete is one of the most resistant to heat and fire. That fire resistance gives houses built with concrete walls certain safety advantages. And those advantages give builders and buyers yet another reason to consider using concrete walls for their next project. Concrete walls include masonry, insulating concrete forms (ICFs), AAC, removable forms, precast, and tilt-up.*

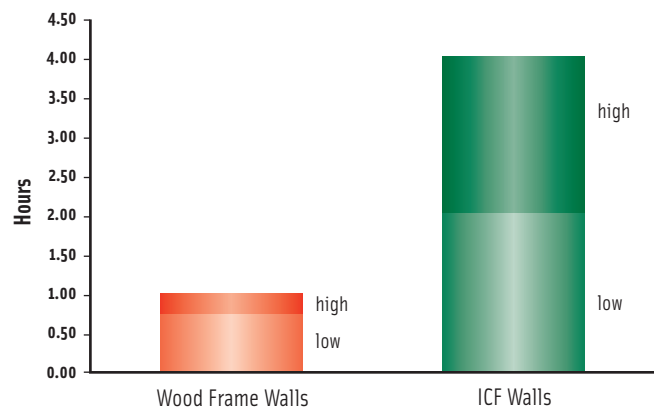
### How well do concrete walls perform in a fire?



Wood frame and concrete masonry walls after fire test.

Experience shows that concrete structures are more likely to remain standing through fire than are structures of other materials. Unlike wood, concrete does not burn. Unlike steel, it does not soften and bend. Concrete does not break down until it is exposed to thousands of degrees Fahrenheit—far more than is present in the typical house fire.

### Fire Ratings



This has been confirmed in “fire-wall” tests. In these tests, ICF and concrete walls were subjected to continuous gas flames and temperatures of up to 2000°F for as long as 4 hours. None of the ICF and concrete walls ever failed structurally. In contrast, wood frame walls typically collapsed in an hour or less. All the ICFs tested were of the “flat” or “uninterrupted grid” type, having no significant breaks in the concrete layer. The concrete walls also had a continuous concrete layer.

### Do they stop fire from spreading?

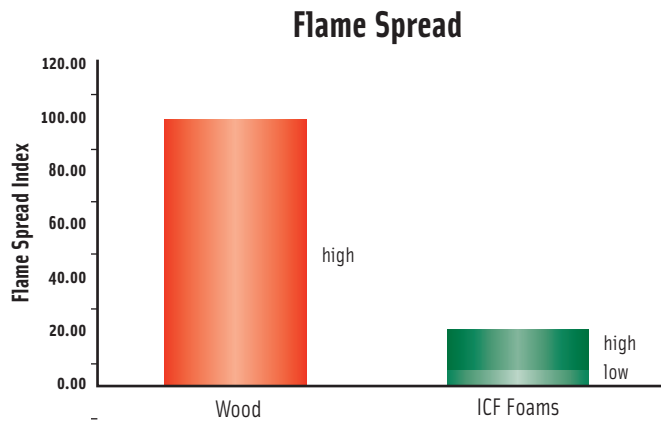
Concrete walls have proven more resistant to fire passing from one side of the wall to the other. This is especially of interest in areas where brush fires could spread into homes, or fires from adjacent structures could jump to the next house.

The fire-wall tests confirmed this rule for concrete and ICFs once again. Part of the tests measured how well a wall slows the passage of heat and fire from the side with the flame to the other side. The ICF and concrete walls tested did not allow flames to pass directly through. They also did not allow enough heat through to start a fire on the cool side for 2–4 hours (for concrete 5 in. or thicker). In contrast, wood frame walls typically allow both flame, and fire-starting heat, through the walls in an hour or less.

### Will the foam add fuel to the fire?

Foams used in ICFs and other concrete walls are manufactured with flame-retardant additives. These prevent the foams from burning by themselves. If you hold a match to the material, it will melt away.

**Fire Resistance of Concrete Homes**



**Concrete Homes are Fire Resistant**

Of course, in a house fire the foam may be subjected to constant flame from other materials burning nearby (wooden floors, fabrics, etc.). The Steiner Tunnel Test measures how much a material carries fire from an outside source. In the test, technicians line a tunnel with the material, run a fire at one end,

then measure how far the flame spreads. In this test, the flame spread for ICF foam is about one-fifth that of wood.

**Can the foam give off harmful emissions?**

Practically any organic material, like wood or plastic, gives off emissions when subjected to intense heat or flame. The Southwest Research Institute reviewed numerous existing studies of fire emissions and concluded that emissions from polystyrene foams are “no more toxic” than those of wood.

**What precautions should I take to make my house fire resistant?**

No matter what your walls are made of, there is no sense playing with fire. Building codes require covering foam insulation on the inside face of exterior walls with a fire-resistant material, such as gypsum wallboard or a stout plaster.

In areas prone to outdoor fires, it is wise to finish foam on the outside face of the exterior with a fire-resistant material. Favorites are portland cement stucco, fiber-cement siding, and concrete masonry.

And of course the more you can design your home to limit the exposure of flammable materials like wood and fabrics, the better off you are.

**What's the bottom line?**

Concrete walls are safer in many ways than wood frame in a fire. Designing your next home with concrete walls would provide an important and effective measure against fire.

*The following resources are available to learn more about fire resistance:*

<b>SP208</b>	VanderWerf, Feige, Chammas, and Lemay <b>Insulating Concrete Forms for Residential Design and Construction</b>	<b>\$75.00</b>
<b>SR267</b>	“Analytical Methods of Determining Fire Endurance of Concrete and Masonry Members” Fire Protection Planning Report	
<b>ACI 216.1-97</b>	“Standard Method for Determining Fire Resistance of Concrete and Masonry Construction Assemblies”	
<b>IT282</b>	VanderWerf and Panushev <b>Insulating Concrete Forms Construction: Demand, Evaluation, &amp; Technical Practice</b>	<b>\$49.95#ND</b>
<b>EB118</b>	HUD, NAHB Research Center, & PCA <b>Prescriptive Method for ICFs in Residential Construction (2nd Edition)</b>	<b>\$25.00</b>



5420 Old Orchard Road Skokie, Illinois 60077-1083  
 Phone: 847.966.6200 Fax: 847.966.9281 Web: www.cement.org  
**More information?** Helpline 1.888.333.4840 www.concretehomes.com